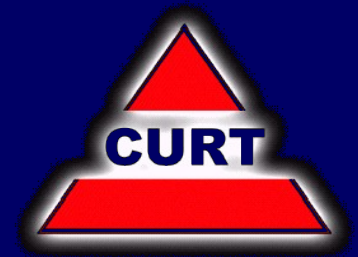


Maximizing Design Benefit: The 21st Century Project Process



**Board of Directors Meeting
CAD GIS Technology Center
December 9, 2003**

We are Responding

- **Just a few months ago the Executive Committee of the Construction Users Roundtable suggested that the Organization pursue the issue of the declining quality of A/E documents**
- **To address the errors and omissions dilemma, I assembled a team of experts spanning the construction industry**

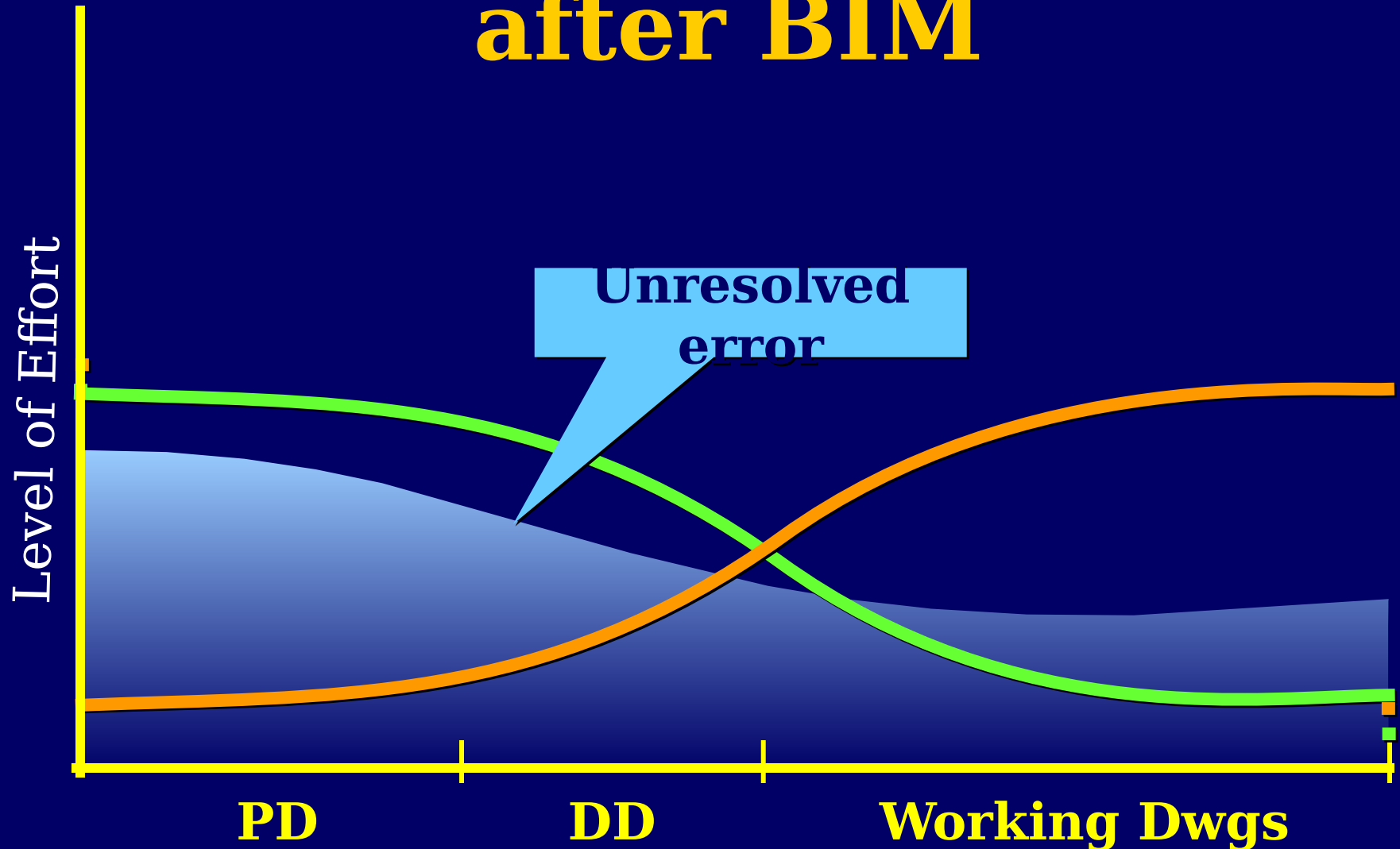
We are Responding

- **Eexecutives of professional firms and software vendors, of owner companies and contractors all agreed to assist in mitigating the growing error rate**
- **We identified that the design process itself posed major problems**

We are Responding

- **The present design process is considered to be fragmented**
- **The result is an increase in QFIs, change orders and subsequent major claims**
- **Claims deplete already strained resources of the Owners**

The Design Process Envisioned before and after BIM



Organizational Structure

**Construction Users
Roundtable**

Create a strategic advantage for
Construction Users
by focusing on business issues that
promote excellence in Construction

Executive
Committee

AE
Productivity
Committee

Identify major causes of errors & omission
A/E documents and find acceptable solution

Academic Team

Professional Team

Contractor/
Subcontract
or

Technology

Federal

Codes/
Regulator
y

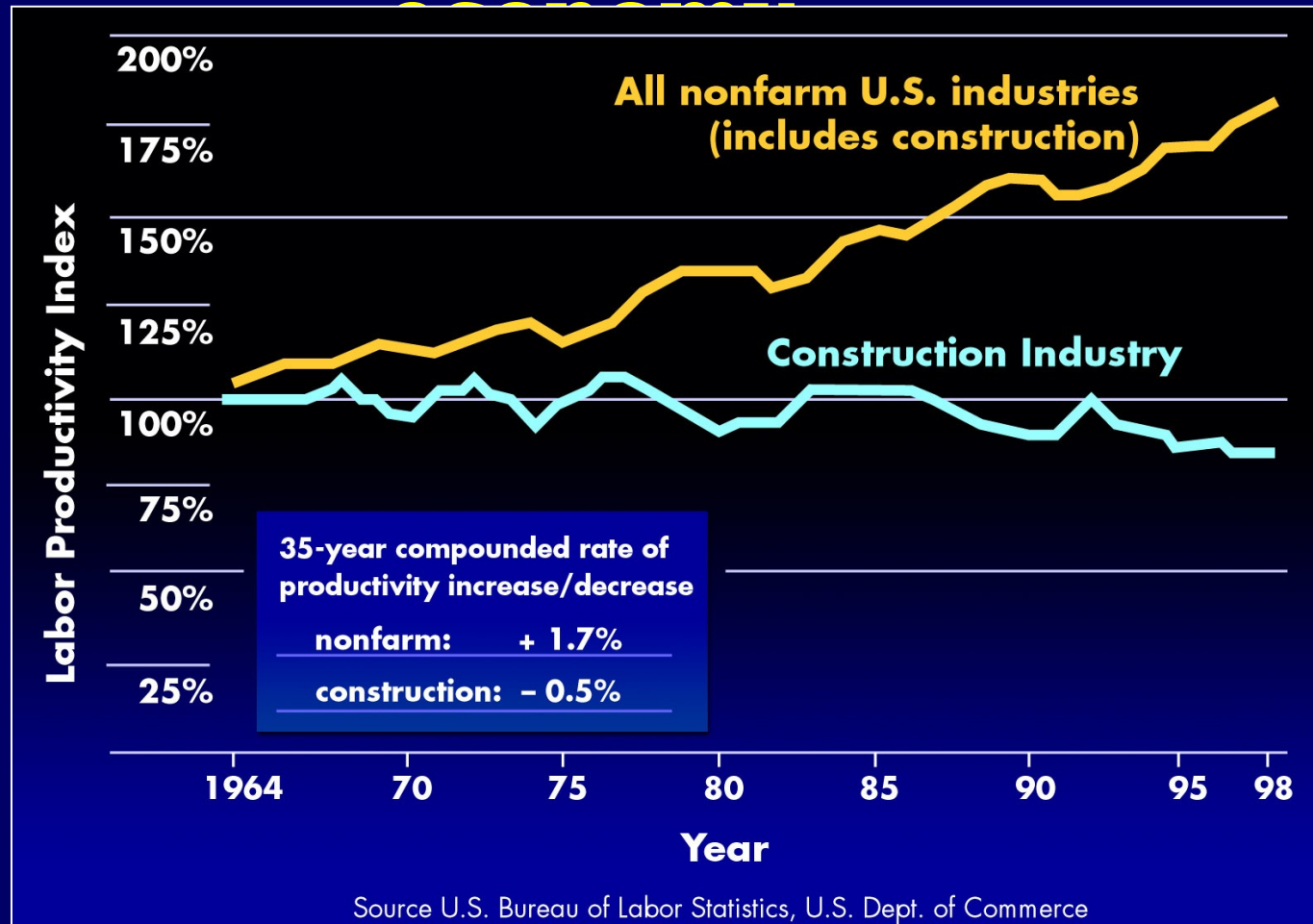
Owner/
Developer

Industrial

Insurance/
Legal/Finan
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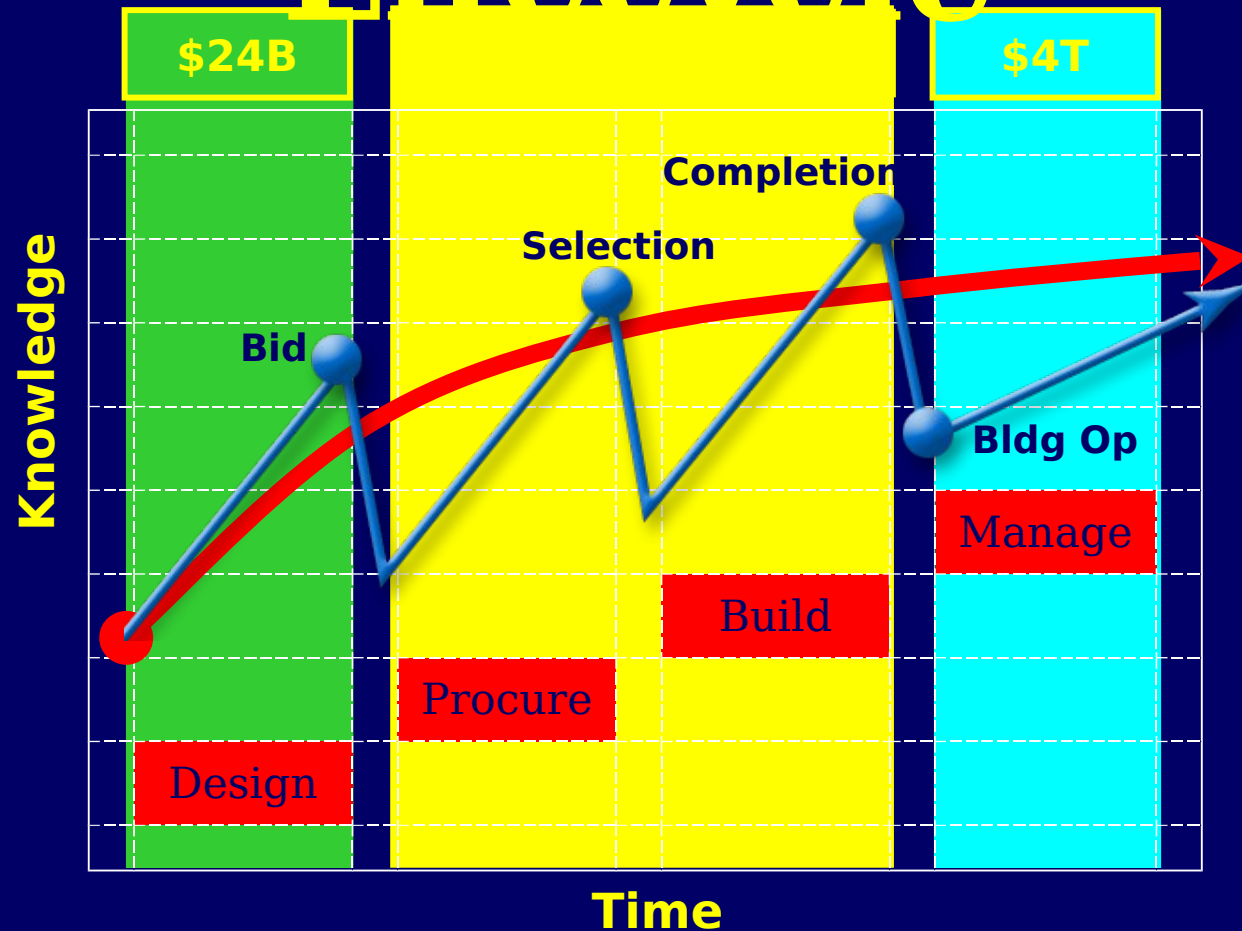
Universiti
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Productivity Gap: Construction lags behind the



This is not just “the industry,” this is

Information Flow In The Building Lifecycle



We made a decision

- **The team early on made the decision to adopt the Building Information Model (BIM)**
- **Although the use of the BIM immediately reduces errors, it is much more than that -**
- **The BIM provides a totally different way of designing**
- **It is what we all expected from CAD**

The Building Information Model

- **It is about information use, reuse, and exchange – electronic documents are just a single component of that process**
- **It is significantly more than transferring electronic versions of paper documents**
- **It is by achieving a faster, higher-quality, richer design process as the 3-D model-based technology is linked with information**

Building Information Model

- **Risk is reduced, design intent is maintained, communication is clearer, higher analytical tools are more accessible**
- **Lower-level tasks such as drafting, view coordination, document generation and schedule creation are automated.**
- **Drawings are automatically updated when modified**

Building Information Model

- **This managed environment will become the catalyst for a major change in the construction industry, from A/Es, contractors and owners**

Errors and Omissions

- Inefficiencies, mistakes and delays account for \$200 bil of the \$650 bil spent on construction in the US every year
- **New wiring, the Economist, January 13, 2000**
- In the UK alone, the annual cost of rectifying construction defects caused by poorly detailed drawings and operatives being given incorrect instructions has been put at \$1.5 bil **IT Construct. Best Practice Svc, <http://www.itcbp.org.uk>**

Results of Inefficiency

- The process of construction is itself repeated in its essentials from project to project. Indeed, research suggests that up to 80% of inputs into buildings are repeated.
- M4i, <http://www.m4i.org.uk>

BIM Advantages

- **A central database handles simultaneously 3-D model data with plans/section views, dimensions, material finishes and much more**
- **Make changes anytime - access the right representations of the building for each phase of design and for all the different partners involved in the project**
- **Source: Graphisoft**

BIM Advantage

- **The Building Information Model is a powerful tool to manage and coordinate all the specialist service discipline data, produces better design solutions and reliable documents faster**
- **Source: Graphisoft**

Interoperability

- **Interoperability has become increasingly more important as we move to more sophisticated systems**
- **Shell reports that quality information reduces costs and improves effectiveness of a facility**
- **In design they estimate that reductions of 10% to 35% of time and cost are achievable**
- **In the US the automobile industry estimated that the industry cost for interoperability is \$1B per annum**

Costs of Interoperability

- **The greatest component of cost of interoperability is devoted to repairing and entering data files that are not usable for downstream application**
- **In the manufacturing industry many different software and hardware systems are being used throughout the supply chain**

Cost of Interoperability

- **Proprietary data systems are prevalent;**
- **The cost of interoperability manifests itself in:**
 - **Avoidance costs**
 - **Mitigating Costs**
 - **Delay Costs**

The ability to communicate data across different activities is essential to the product and competitiveness of the industry (Brunnermeier and Martin 1999)

We are in the 21st Century

- **We shy away from the challenge that will materially change the way the construction industry will do business**
- **Now we have the opportunity to capture our environment in a 3-D model for future generations.**
- **It is up to us how we approach this new technology**